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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/826,367

Applicant(s)

AOYAMA ET AL.

Examiner

EUGENIA WANG

Art Unit

1795

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 July 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-29 and 31-33 is/are rejected.
- 7) ☒ Claim(s) 30 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/CD/CD)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. In response to the amendment received July 24, 2008:
 - a. Claim 33 has been added as per Applicant's request. Claims 1-33 are pending.
 - b. The previous 112 rejection has been withdrawn in light of the amendment.
 - c. The previous rejections of record have been maintained, thus the action is final.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-7, 10-13, and 33 are rejected under 35 U.S.C. 102(b) as being anticipated by US 2003/0056440 (Aoyama et al.).

As to claim 1, Aoyama et al. teach a power system (see fig. 1). The power system includes fuel cell [70], a fuel gas generation system (vaporizer [20], mixer [30], reformer [40], and hydrogen separator [60]). The hydrogen line is supplied to the fuel cell via inlet [71]. Furthermore, there is a purge system for the hydrogen separator, which is operated using pump [74]. Pump [74] is connected to a control unit [10]. The controller is also connected to the raw material line via valve [31], and thus has the

capability to receive a stop signal for supplying hydrogen to the fuel cell and to activate a purge mode to purge gas or a no-purge mode to merely stop the hydrogen flow.

It has been held that the recitation of an element is “capable” of performing a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. *In re Hutchinson*, 69 USPQ 138.

While intended use recitations and other types of functional language cannot be entirely disregarded. However, in apparatus, article, and composition claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. *In re Casey*, 370 F.2d 576, 152 USPQ 235 (CCPA 1967); *In re Otto*, 312 F.2d 937, 938, 136 USPQ 458, 459 (CCPA 1963).

Claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danly*, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). See also MPEP § 2114.

The manner of operating the device does not differentiate an apparatus claim from the prior art. A claim containing a “recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus” if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

As to claim 2, Aoyama et al. inputs many parameters that would indicate the working state of the power system, for example the temperature sensor [64] on the hydrogen separator [60] (fig. 1). Since they are both connected to the controller, the controller is capable of selecting the hydrogen purge or hydrogen-no purge based on this parameter. (See rejection of claim 1 for Office's position on "capable" of for an apparatus.)

As to claims 3, 10, 11, and 33 the structure of Aoyama et al. in fig. 1 is capable of performing the function of the claims using controller [10] and its connections. (See rejection of claim 1 for Office's position on "capable" of for an apparatus.)

As to claim 4, Aoyama et al. inputs many parameters that would indicate the working state of the power system, for example the temperature sensor [64] on the hydrogen separator [60] (fig. 1). Since they are both connected to the controller, the controller is capable of switching to hydrogen purge or hydrogen-no purge based on this parameter. (See rejection of claim 1 for Office's position on "capable" of for an apparatus.)

As to claims 5 and 6, controller [10] measures the temperature of the hydrogen separating portion [60] via sensor [64], and the controller is capable of switching from hydrogen purge to hydrogen no-purge mode based on a preset level of a temperature. (See rejection of claim 1 for Office's position on "capable" of for an apparatus.)

As to claim 7, the system of Aoyama et al. has a booster mechanism that boosts the pressure of hydrogen in the hydrogen supply line. This is done using raw material valve [31] (closing the valve reduces pressure, and opening it increases pressure to the

mixer, which would affect the anode inlet pressure). Since the valve is connected to the controller [10], the system controls the booster mechanism.

Response to Arguments

3. Applicant's arguments filed July 24, 2008 have been fully considered but they are not persuasive.

Applicant argues that Aoyama et al. fails to teach a power system that includes any feature that can reasonably be considered to correspond to the stop control module having the combination of features recited in claim 1.

Examiner respectfully disagrees. The controller of Aoyama et al. is relied upon to encompass being capable of having the claimed stop control module. Since the stop control module is defined only by functions, it is unclear how the stop control module is a structural feature and not a functional feature, and how this is not encompassed by the controller of Aoyama et al. The functionality which is specific to what Applicant's claim is not given weight, as it is functional definitions of an apparatus claim, wherein it is viewed that the apparatus of Aoyama et al. is capable of a "stop module" defined by the actions in the claim. It is unclear how Aoyama et al.'s system cannot be interpreted as capable of having such a stop control module, wherein the stop control module is completely defined by functionality. The claim language does not exclude this interpretation. Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Also, limitations appearing in the

specification but not recited in the claim are not read into the claim. See *In re Zletz*, 893F.2d 319, 321-22, 13 USPQ2d, 1320, 1322 (Fed. Cir. 1989).

Applicant argues that the Office Action mischaracterizes the stop control module as allegedly reciting features that the module is "capable" of performing.

Examiner respectfully disagrees with Applicant's position. As previously set forth, the stop control module, as claimed, is defined only by functions (selects, activates, controls, stops, executes). These functions are capable of being performed by the controller of Aoyama et al., which has the controller connected in the same manner, as set forth in the rejection. Examiner is uncertain how something that is defined merely by functions is a structural feature. Thus, Examiner has applied the interpretation that the stop control module is functional, as it is defined only by functions, wherein the controller of Aoyama et al. in conjunction with the pumps and valves, is structurally the same as that of the claimed invention. Thus, it is seen to read on the claimed invention.

Applicant argues that functional limitations are not recited.

Examiner respectfully disagrees. The claim language only defines the stop control module by functions, wherein it selects..., activates..., controls..., stops..., and executes.... Examiner is unsure how such claim language does not define functions as only actions (i.e. the manner in which it functions) are being defined. Accordingly, the modules are defined by functions, and thus the module is not seen to be a structure. It is also unclear on how the modules are not embodied or capable of being embodied by the control unit. The term module is broader than what Applicant is interpreting, as it is

defined by functions and thus is not necessarily a physical aspect. It is uncertain how the controller (computer) of the prior art cannot operate in the same manner to have modules therein.

Applicant argues that Examiner has not established that Aoyama et al. explicitly or inherently has features that correspond to each of the positively recited claimed features and merely state that certain features of Aoyama et al. are considered to be capable of performing certain function.

Examiner respectfully disagrees. Examiner's position is clearly stated in the previous Office Action and upheld herein. It is reiterated herein that the controller of Aoyama et al. that the controller of Aoyama et al. is capable of functioning in the same manner as the claimed invention (please see the rejection for the Office's policy on "capable of" with respect to apparatus claims). Therefore it is capable of modules therein, as claimed, where the modules themselves are functions, as they are only defined by functions. Applicant makes many broad statements without providing a rationale or reasoning as to why Examiner's position is incorrect. Accordingly, such arguments are not persuasive, and the previous position is maintained.

Applicant argues that the use of *In re Hutchison* is flawed, since it was originally used in conjunction with "adapted for use" language, wherein applicant does not use the language of "adapted for use" or "capable of performing."

Examiner respectfully disagrees. The fact that "adapted for" language and "capable of" language is not used in the claims, does not negate the fact that the controller of Aoyama et al., as relied upon, is capable of performing the functions in the

claim language, as set forth in the rejection, wherein it is particularly noted that such functions do not *structurally* define the apparatus. Accordingly, since it is capable of performing the same function, such application is seen as proper.

Applicant argues that the other judicial precedents, which the [previous] Office Action recites, are flawed, because it merely paraphrases Applicant's claim language.

Examiner respectfully disagrees. The interpretation of the claim language and how Aoyama et al. applies to the claimed invention is clearly set forth in the rejection, and upheld by the above response to arguments. Again it is emphasized that the stop control module is defined only by functions, and accordingly is viewed as functional language. Accordingly, such functions are not seen as structural limitations. Applicant makes many broad statements without providing a rationale or reasoning as to why Examiner's position is incorrect. Therefore, such arguments are not seen as convincing, and the rejection of record is maintained.

Applicants notably point out that their stop control module selects a hydrogen purge mode that activates and controls the purge supply module to remove hydrogen from the hydrogen separation module or a hydrogen no purge mode that activates and controls the purge supply module to remove hydrogen from the hydrogen separation module or a hydrogen no purge mode that stops the purge gas supply module as a stop control mode, and executes stop control in the stop control mode to stop the supply of hydrogen to the fuel cells, wherein Aoyama et al. has no module that has been show that "selects ... activates ... and controls ..." as recited above.

Examiner respectfully disagrees with Applicant's position. As previously set forth, the claim language recited above only define the stop module defined by functions, wherein it selects..., activates..., controls..., stops..., and executes.... Examiner is unsure how such claim language is structural and not functional, as only actions (i.e. the manner in which it functions) are being defined. Accordingly, it is viewed that the modules are defined by functions, and thus the module is not seen to be a structure. Accordingly, as applied within the rejection, the controller of Aoyama et al. is seen as capable of performing all of such functions, wherein it is unclear on how the modules are not embodied or capable of being embodied by the control unit. The term module is broader than what Applicant is interpreting, as it is defined by functions and thus is not necessarily a physical aspect. It is uncertain how the controller (computer) of the prior art cannot operate in the same manner to have modules therein.

Applicant argues that Examiner mischaracterizes the claim with the recitation that the controller controls different valves and is thus capable of performing such functions, since the judicial precedents regarding "capable" of are improperly applied.

Examiner respectfully disagrees with Applicant's position. The stop control module, as claimed, is defined only by functions. These functions are capable of being performed by the controller. Examiner is uncertain how something that is defined merely by functions is a structural feature. Thus, Examiner has applied the interpretation that the stop control module is functional, as it is defined only by functions. Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023,

1027-28 (Fed. Cir. 1997). Also, limitations appearing in the specification but not recited in the claim are not read into the claim. See *In re Zletz*, 893F.2d 319, 321-22, 13 USPQ2d, 1320, 1322 (Fed. Cir. 1989). Accordingly, it is seen that the judicial precedents are not improperly applied, as an apparatus is claimed, wherein Applicant has not clearly defined the structural difference between Aoyama et al. and the claimed invention.

Applicant argues that functional limitations are not relied upon, but a specific structural interrelationship is being relied upon, which is not explicitly or impliedly taught by Aoyama.

Examiner respectfully disagrees with Applicant's position. The stop control module, as claimed, is defined only by functions. These functions are capable of being performed by the controller. Examiner is uncertain how something that is defined merely by functions is a structural feature. Thus, Examiner has applied the interpretation that the stop control module is functional, as it is defined only by functions. Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Also, limitations appearing in the specification but not recited in the claim are not read into the claim. See *In re Zletz*, 893F.2d 319, 321-22, 13 USPQ2d, 1320, 1322 (Fed. Cir. 1989). Applicant has not provided any showing or reasoning the recitation of the actions/functions within claim 1 are structural. Therefore, such an argument is not convincing, and the rejection of record is upheld.

Applicant argues that Aoyama et al. disclose a hydrogen generation device that does not require a purge gas supply (para 0033) and thus cannot be considered to activate or control in a hydrogen purge mode, or remove hydrogen in the hydrogen purge separation module.

Examiner respectfully disagrees with Applicant's position. Applicant is mischaracterizing Aoyama et al.'s teaching. Although there is a statement that the system may do without such purge gas supply, the rest of the paragraph and teaching embody having the purge gas supply. The beginning portion of para 0033 is drawn to having a purge gas supply, as are the drawings (see para 0033; fig. 1). One of ordinary skill in the art would not read the end of para 0033 in a vacuum. Contrary to Applicant's argument, it is clear that the preferred embodiment of Aoyama et al. includes the purge gas supply. Therefore, the previous position is upheld.

Applicant argues that any control of purge gas disclosed in Aoyama would be for controlling the temperature profile to keep the membrane from being brittle.

Examiner respectfully disagrees with Applicant's position. Although this may be what Aoyama et al. intended for the use of the purge gas, it does not negate the fact that the structure of Aoyama et al. and that of the claimed invention are the same. Therefore, since Aoyama et al. and the claimed invention are seen as still structurally the same, such an argument, directed towards functionality is irrelevant. Accordingly, Examiner upholds the fact that Aoyama et al. would still be capable of performing the same functions, as the structure is the same. Applicant has not clearly shown any

reasoning as to how Aoyama et al. would not be capable of performing the functions laid out by the instant application.

Applicant argues that it is unclear how the control unit [10] of Aoyama can reasonably be considered to activate and control in any alleged hydrogen purge mode, a purge gas supply module, which Aoyama indicates is not required.

Again, Examiner respectfully disagrees with Applicant's position. Applicant is mischaracterizing Aoyama et al.'s teaching. Although there is a statement that the system may do without such purge gas supply, the rest of the paragraph and teaching embody having the purge gas supply. The beginning portion of para 0033 is drawn to having a purge gas supply, as are the drawings (see para 0033; fig. 1). One of ordinary skill in the art would not read the end of para 0033 in a vacuum. Contrary to Applicant's argument, it is clear that the preferred embodiment of Aoyama et al. includes the purge gas supply. Therefore, the previous position (as to such capability) is upheld.

Applicant argues that Examiner's position in the previous Office Action mischaracterizes Applicant's arguments in section 14, wherein Examiner states that a control system, indicated, but not explicitly shown, is capable of operating in such a purge manner stretches beyond reasonability of a 102.

Examiner submits that section 14 that Applicant relies upon is dealing with the 103 rejections and not with Aoyama et al. as a 102, which is rather addressed in section 5 of the previous office action. Therefore such an argument is not applicable. The not explicitly shown control system is drawn to the use of Meyer et al. Unlike Meyer, Aoyama et al. clearly shows the controller and the valves that it is connected to.

Accordingly, it is seen as structurally the same as that of the claimed structure of the instant application (as set forth in the rejection to claim 1). Accordingly, it is submitted that Aoyama et al., with a control system shown, does show what it is capable of. Therefore, the rejection of record is maintained.

Accordingly, the rejections (applied to the base claim 1 as well as the dependent claims 2-7 and 10-13) using Aoyama et al. as a prior art are seen to be proper and are upheld.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 8, 9, 12, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoyama et al.

The teachings of Aoyama et al. have been previously taught and are herein incorporated.

As to claim 8, Aoyama et al. teach a heat exchanger [50] that is adjacent to the hydrogen separator [60] (fig. 1). Aoyama does not provide a connection for operation of the heat exchanger to the control unit, so that the stop control module (controller [1]) controls the heat exchanger to keep the temperature of the hydrogen separation module in the no-purge mode. The motivation for providing a heat exchanger to the hydrogen separation module during the no purge mode is that the hydrogen separator membrane has a tendency of becoming fragile or brittle during low temperature absorbing (para 0006, lines 1-4). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to provide a heat exchanger adjacent to keep the hydrogen separator at a certain temperature during the no-purge mode in order to prevent the separator membrane from becoming brittle.

As to claim 9, the obviated structure of Aoyama et al. is capable of providing the function of claim 9. (See rejection of claim 1 for Office's position on "capable" of for an apparatus.)

As to claim 12, Aoyama et al.'s teaching in fig. 1 has a controller that regulates the supply of material to the chemical reaction module via raw material valve [31] and air valve [32]. Aoyama et al.'s structure with the controller receives restart request, and the connection of the controller would be capable of supplying a greater amount of

material to the chemical reaction module in response to input of a restart request after the stop control in the hydrogen purge mode.

Aoyama et al. does not teach that the control unit is connected to the fuel cell and checks the output demand to the fuel cell. However there is motivation for judging how much raw material should be supplied in order to meet the demand. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to provide a controller to check the fuel demand of the fuel cells in order not to oversupply or undersupply the fuel cell with the reactant.

As to claim 13, Aoyama's obviated system of claim 12 would have the capability to provide the functionality of controlling supply based off of output demand. (See rejection of claim 1 for Office's position on "capable" of for an apparatus.)

5. Claims 17-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoyama et al, (as applied to claims 1, 2, 3, 8, 10, and 12) in view of US 2001/0016276 (Yamanashi).

As to claim 17, 19, and 24-28, Aoyama et al. do not teach that the fuel cell is used in the motor driving source in a mobile object.

Yamanashi teach a fuel cell used in a vehicle (abs). As seen in fig. 1, the fuel cell that is connected to the drive motor via fuel cell control unit [23] and vehicle control unit [24]. The motivation for using the system of Aoyama et al. in a vehicle, where the fuel cell is connect to the drive motor, is that it a source of more environmentally friendly energy, as compared to conventional fuels. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use

the fuel cell system of Aoyama et al. in the car system of Yamanashi to provide a cleaner option of providing power to a car.

As to claim 18, Yamanashi's motor inherently has an on-off state start switch, as is evidenced by the presence of the vehicle control until [24] (fig. 1). The combined fuel cell and control unit of Aoyama et al. in the system of Yamanashi would be capable of stopping the hydrogen purge mode when the starter switch is off, since the fuel cell control unit and vehicle control unit are connected. (See rejection of claim 1 for Office's position on "capable" of for an apparatus.)

As to claim 20, the combined control system of Aoyama et al. (with respect to the fuel cell) in tandem with that of Yamanashi (the connection of the vehicle control unit, which is connected to the fuel cell control unit), would have the capability of manipulating the moving of the mobile object and of restarting the fuel gas generation system upon input operation of allowing movement during the purge mode. (See rejection of claim 1 for Office's position on "capable" of for an apparatus.)

As to claim 21, the combined control system of Aoyama et al. (with respect to the fuel cell) in tandem with that of Yamanashi (the connection of the vehicle control unit, which is connected to the fuel cell control unit) has been previously obviated. The vehicle shown in fig. 1 of Yamanashi has vehicle speed sensor connected to vehicle control unit as well. Therefore the combined structure of Yamanashi and Aoyama et al. would have the capability of restarting the fuel gas generation system with respect to a preset moving speed in the hydrogen no purge mode. (See rejection of claim 1 for Office's position on "capable" of for an apparatus.)

As to claims 22 and 23, Aoyama et al. is capable of receiving a restart request via controller [10]. (See rejection of claim 1 for Office's position on "capable" of for an apparatus.) The use of Aoyama et al.'s fuel cell in the use of vehicle has been obviated with Yamanashi. Aoyama et al. further teaches the temperature monitoring of the hydrogen separating portion [60] via sensor [64]. Aoyama et al. also teach a heat exchanger [50] that is adjacent to the hydrogen separator [60] (fig. 1).

Aoyama does not provide a connection for operation of the heat exchanger to the control unit, so that it can be used to warm the fuel gas generation system in response to a restart request when the observed temperature is not higher than a preset lower limit while in the hydrogen purge mode. The motivation for providing heat to the hydrogen separation module is that the hydrogen separator membrane has a tendency of becoming fragile or brittle during low temperature absorbing (para 0006, lines 1-4). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to provide a heat exchanger adjacent to keep the hydrogen separator at a certain temperature during the purge mode in order to prevent the separator membrane from becoming brittle.

6. Claims 14-16 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoyama et al. (as applied to claim 1) in view of US 6063515 (Epp et al.).

As to claim 14, Aoyama et al. does not provide a secondary battery to the fuel cell system with a power supply control module that controls the supply of electric power from the secondary battery.

Epp et al. teach the use of a secondary battery [306] for supplementing the power generated by the fuel cell (col. 11, lines 8-12). As Epp et al.'s system says that the power of the battery is only used when the fuel cell generated power is not enough, a sort of determination control is inherently applied to the load, fuel cell, and battery to determine if the battery power is needed.

The motivation for providing a secondary battery to the teaching of Aoyama et al. is to ensure that the load will still work even if the fuel cell does not provide enough electricity to it. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made combine a secondary battery with a fuel cell in order to guarantee that the load has enough power to run on.

As to claim 15, the battery in Epp et al.'s system inherently has an output demand input module that receives an output demand to the power system, wherein in response to the output demand of not greater than a preset level, the power control module controls the secondary battery to output electric power. The support for this is stated within Epp et al.'s use for the battery – the fact that it is only employed when the demand of electrical load [360] exceeds the output of the fuel cell stack [305] (col. 11, lines 8-12). As it talks about the demand of load [360] and output of fuel cell stack [305], it inherently has an output demand and input module. Furthermore, inherent control module has been previously established of being capable of executing the stop control in the hydrogen no-purge mode.

As to claim 16, Epp et al. does not teach that the secondary battery has a state of charge measurement module, wherein the stop control module executes the stop

control of the hydrogen purge mode when the observed state of charge is not higher than that of a preset level.

However, there is motivation for providing the state-of-charge measurement module. The motivation for providing such a module on the secondary battery is to ensure that the load (in this case the submarine) has enough power to sustain the load. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to include the state-of-charge measurement module on the battery in order to provide the user of the load with a warning about battery replacement in order to ensure that the load will function. (There is motivation for applying a control system to the stop controller to purge when the state of charge is not higher than a certain value; it is in order to ensure proper shut down of the fuel cell system. Not only is this function obviated, but the system of Epp et al. would be capable of being programmed for such a function with the obviated state-of-charge measurement module on the secondary battery.)

As to claims 29, Aoyama et al. does not teach that the fuel cell is used in a mobile object, namely for the motive drive force.

Epp et al. teaches that the fuel cell system is used in submarines (as indicated by the title), but it does not specifically mention that power generated by their fuel cell system is used to power the motor of a mobile object. However, since the fuel cell system is applied to a submarine, the power generated is capable of being used for motor.

7. Claims 1-6, 10-13, 17, 18, 24, 27, 28, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2003/0072978 (Meyer et al.) in view of Epp et al., as evidenced by US 6410175 (Tillmetz et al.).

As to claim 1, Meyer et al. teach a fuel cell system. The fuel cell system has a fuel processing system [104], where fuel processing system includes an autothermal reformer [134] (para 0017, lines 1-3). The autothermal reformer [134] takes fuel, air, and steam and converts it to hydrogen, carbon dioxide, and carbon monoxide (para 0018, lines 1-3). Therefore, the autothermal reformer acts as the chemical reaction module. The hydrogen, carbon dioxide, and carbon monoxide is further fed through a shift converter and selective oxidizer (which rids the gaseous product of CO₂) before being provided to the anode [124] of the fuel cell (figure). Although a stop input module and stop control module is not specifically mentioned in Meyer et al.'s system, one inherently exist. This is exemplified by the fact that it talks about a shutdown system and the controlling of a switch [132], valves [141, 152, 154, 156], and blowers [116B, 116C]. In further accordance with Meyer et al.'s shutdown process, diverter valves [140, 149] are opened, which results in purging both sides of both sides of the fuel cell as well as the fuel processing system [104] of residual hydrogen and carbon monoxide (para 0025; para 0026, lines 1-4). Although not specifically mentioned, Meyer et al.'s system is inherently stops with an initial no-purge mode, as some time inherently passes between stopping and shutdown mode. Additionally, it is capable of programmed to stop with the no-purge mode in addition to the purge mode as described above, what with the inherency of the controller due to the sensors and valves present.

It has been held that the recitation of an element is “capable” of performing a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. *In re Hutchinson*, 69 USPQ 138.

While intended use recitations and other types of functional language cannot be entirely disregarded. However, in apparatus, article, and composition claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. In re Casey, 370 F.2d 576, 152 USPQ 235 (CCPA 1967); In re Otto, 312 F.2d 937, 938, 136 USPQ 458, 459 (CCPA 1963).

Claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. In re Danly, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). See also MPEP § 2114.

The manner of operating the device does not differentiate an apparatus claim from the prior art. A claim containing a “recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus” if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

Meyer et al. does not teach a hydrogen separation module within a fuel processing module. However Epp et al. teach a hydrogen separator after the reformer

section. It would have been obvious to replace the shift converter and selective oxidizer, with Epp's hydrogen separate also serves the purpose of removing carbon dioxide from the hydrogen (col. 4, lines 8-14)) in order to purify the hydrogen fuel before it is fed into the fuel cell. This change is evidenced by the fact that Tillmetz et al. equates the shift converters, selective oxidizers, and hydrogen separators as having the same function in a fuel processing subsystem (col. 2, lines 10-20). (Providing the hydrogen purification system in the Meyer et al. fuel cell system would also provide the hydrogen because the stop signal input module, purge gas supply module, and stop control module to it as well.)

As to claim 2, Meyer et al.'s system has an input module inputting a predetermined parameter (startup/shutdown), where the stop control module (startup and shutdown inherently done by the previously established controller), which selects either the hydrogen purge or hydrogen no-purge mode, as the stop control mode is based on that input parameter and executes the stop control in the selected stop control mode. (See rejection of claim 1 for the Office's position on "capable" of for an apparatus claim.)

As to claim 3, the control module that inherent exists in Meyer et al.'s system has already been established. Therefore it (acting as the stop control module) would be capable of changing over the stop control mode to the hydrogen purge mode (shutdown) after execution of the stop control in the hydrogen no-purge mode (startup). (See rejection of claim 1 for the Office's position on "capable" of for an apparatus claim.)

As to claim 4, the inherent controller of Meyer et al.'s system is capable of acting as a parameter input module that inputs a predetermined parameter (shutdown/startup) representing a working state of at least one of the power system and a system with the power system mounted thereon, wherein the stop control module switches over to the stop control from the hydrogen no-purge mode to the hydrogen purge mode, when the input parameter fulfills a preset condition. (See rejection of claim 1 for the Office's position on "capable" of for an apparatus claim.)

As to claims 5 and 6, Meyer et al. teaches that during startup the fuel cell that the anode is initially purged (para 0027). This is continued until the reformer [143] and the shift converter [136] (replaced with hydrogen separator) is approximately 250°C.

Meyer et al. does not, however, teach to purge the fuel processing system until the temperature at the reformer [134] shift converter [136] is 250°C. However, the motivation for purging the fuel processing system as well is to cleanse the system of any contaminants that could have gathered during the off time, so they would not be provided to the fuel cell once normal function of the fuel cell and fuel processor commenced. Another motivation would be to aid in the warm-up process. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to purge the fuel processor when the shift converter is at a lower temperature than the preset level in order to cleanse the contaminants from the system as well as to aid in the warm-up process.

As to claim 10, Meyer et al. teaches a startup mode (no purge). This actuates the purge gas supply (as the mode switches from shutdown (purge) to startup (no purge)), where actuating is just seen as any movement within the purge valve.

As to claim 11, Meyer et al.'s system inherently actuates the purge gas supply module after a certain time period has elapsed since the actuation of the gas supply module in the hydrogen no-purge mode. This time period elapsed is taken to be that of lag time between two modes (startup/normal/shutdown).

As to claim 12, Meyer et al. teaches a start-up fuel cell procedure (the "restart request input") (para 0027-0029). This start-up procedure is controlled by the inherently present but not shown control system (as established earlier) and would be capable of requesting a demand output, as it is connected to the load and thus can read the load demand. Furthermore, it is capable of regulating the amount of material supplied to the fuel processing system due to a restart request via valves [146, 154, 152] and blower [116C] such that the amount supplied is more than that of the normal state. (See rejection of claim 1 for the Office's position on "capable" of for an apparatus claim.)

As to claim 13, Meyer et al.'s system would be capable of changing the material supplied to the fuel processing section [104], and thus with its inherent controller would be capable of supplying a greater amount of material to the fuel processing system than normal supply in the state of normal operations when output demand is not greater than a preset level after a start of the stop control in the hydrogen purge mode. (See rejection of claim 1 for the Office's position on "capable" of for an apparatus claim.)

As to claim 33, the control module that inherent exists in Meyer et al.'s system has already been established. Therefore it (acting as the stop control module) would be capable of selecting a hydrogen purge mode as a stop control mode when the stop control executes stop control to stop the fuel gas generation system for a long period of time when the stop control module executes stop control to temporarily stop the fuel gas generation system (shutdown). (Note valves [149] and [146] are controlled (para 0026-0027). (See rejection of claim 1 for the Office's position on "capable" of for an apparatus claim.)

As to claims 17, 24, 27, and 28, Meyer et al. does not teach that the power generated by their fuel cell system is used to power the motor of a mobile object.

However, the similar system of Epp et al. recites the use of its fuel cell system for a submarine, which is a mobile system with a motor. (Although not specifically mentioned that the motor is drawing power from the fuel cell, the fuel cell is capable of providing power for the motor system.) The motivation for using a fuel cell in a mobile system, namely the motor, would be to use an environmentally friend source of electricity needed to run the motor (as opposed to traditional fuels). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use a widely known, more environmentally friend form of electricity to run a mobile device, namely the motor.

As to claim 18, the Meyer et al.'s system has been obviated to be used in a mobile object, as seen above. However, Meyer et al.'s system does not teach that the predetermined parameter includes a parameter representing an on-off state of a starter

switch on the motor, where the stop control module executes the stop control it the hydrogen purge mode when the starter witch is off. The motivation for providing such a control within a vehicle system is that the fuel cell does not generate power (for the motor) during the shutdown system, and so by corroborating the (lack of) power demand with the off position of the starter switch will prevent the fuel cell from providing power after the motor is no longer engaged. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to combine a parameter for the on-off state of the starter switch of the motor (startup/shutdown) with the stop control module in order to keep the fuel cell from generating unnecessary power.

8. Claims 8, 9, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meyer et al. in view of Epp et al. as evidenced by Tillmetz et al. (as applied to claim 1), in further view of Aoyama et al.

As to claim 8, the combination of Meyer et al., Epp et al., and Tillmetz et al. does not teach a temperature retention module that keeps temperature in the hydrogen separation module, wherein the stop control module controls the temperature retention module to keep the temperature in the hydrogen separation module during the hydrogen no-purge mode.

Aoyama et al. teach a heat exchanger [50] that is adjacent to the hydrogen separator [60]. The motivation for providing a heat exchanger to the hydrogen separation module during the no purge mode is that the hydrogen separator membrane has a tendency of becoming fragile or brittle during low temperature absorbing (para

0006, lines 1-4). (The time that the most hydrogen would be absorbed would be during the no-purge time rather than the purging time.) Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to provide a heat exchanger adjacent to keep the hydrogen separator at a certain temperature in order to prevent the separator membrane from becoming brittle.

As to claim 9, the combination of Meyer et al., Epp et al., and Tillmetz et al., and Aoyama et al. does not teach stopping the operation of the temperature retention module via a stop control module, when stop control in the hydrogen no-purge mode continues for at least a present time period. However, this function would be obviated with the combined structure of Epp et al., and Tillmetz et al., and Aoyama et al.. This is because after startup (no purge) the fuel provided to the reformer and subsequently the hydrogen separator comes from burner [110], which maintains the temperature of the hydrogen that is provided to the hydrogen separator. The motivation for discontinuing the use of the heat exchanger on the hydrogen separator after a period of time is to conserve the energy that the heat exchanger would use. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to apply time constraints to operation of the heat exchanger in order to save energy.

As to claim 26 Meyer et al. does not teach does not teach that the power generated by their fuel cell system is used to power the motor of a mobile object.

However, the similar system of Epp et al. recites the use of its fuel cell system for a submarine, which is a mobile system with a motor. (Although not specifically

mentioned that the motor is drawing power from the fuel cell, the fuel cell is capable of providing power for the motor system.) The motivation for using a fuel cell in a mobile system, namely the motor, would be to use an environmentally friendly source of electricity needed to run the motor (as opposed to traditional fuels). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use a widely known, more environmentally friendly form of electricity to run a mobile device, namely the motor.

9. Claims 1, 7, 14-16, 19, 20, 23, 25, 29, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Epp et al. in view of Meyer et al.

As to claim 1, Epp et al. teaches a power system with a fuel gas generation system [301] with a vaporizer [312] and a reformer [313] and hydrogen separator [302], where the hydrogen fuel is delivered to the fuel cell via inlet [380] (fig. 3). Epp et al. does not teach a shut down system, however, a fuel cell that operates inherently has a startup and shutdown mode, wherein the shutdown mode inherently stops the supply of the reactants to the fuel cells. This signal is accomplished by a control system for the system, which is inherent but not shown in fig. 3. The indication of the presence of a control system is the fact that valves [359, 391] and sensors [361, 363] are in the system and must provide information to a controller to be controlled by said controller.

However Epp et al. does not teach a purge gas supply module that supplies specified purge gas for the removal of hydrogen from the hydrogen separation module. Meyer et al. teach a fuel cell system with a fuel processing system [104], similar to that of Epp et al.'s system. However Meyer et al.'s system provides a shutdown process,

which purges the fuel processing system [104] of the residual hydrogen (para 0026, lines 1-3). The motivation for combining the purge system of Meyer et al. with Epp et al.'s system is to cut back on reactant damage to the fuel processing system (which the is vaporizer [312], reformer [313], and hydrogen separator [302] in Epp et al.'s system) and to avoid the possibility of combustion in the instance that the fuel processing system does not react 100% and fuel is present within the fuel processing system. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to apply Meyer et al.'s purge system to Epp et al.'s system in order to cut down on reactant damage to the fuel processing system and in order to cut down on the change of accidental combustion.

The obviated structure of Epp et al. with Meyer et al.'s pure system would then be capable of having a stop control module (present with the inherent control system) which has a hydrogen purge mode and hydrogen no-purge mode, where leftover hydrogen is purged and where hydrogen is not delivered to the fuel cells, respectively.

It has been held that the recitation of an element is "capable" of performing a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. *In re Hutchinson*, 69 USPQ 138.

While intended use recitations and other types of functional language cannot be entirely disregarded. However, in apparatus, article, and composition claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim

drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. In re Casey, 370 F.2d 576, 152 USPQ 235 (CCPA 1967); In re Otto, 312 F.2d 937, 938, 136 USPQ 458, 459 (CCPA 1963).

Claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. In re Danly, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). See also MPEP § 2114.

The manner of operating the device does not differentiate an apparatus claim from the prior art. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

As to claim 7, Epp et al.'s system has compressor [372] between the fuel inlet [380] and the hydrogen separator [302] (fig. 3).

However, Epp et al. does not teach the stop control module to control the compressor (booster mechanism) to boost the pressure of hydrogen in the hydrogen supply line in the no-purge mode. However, Meyer et al.'s system mentions startup (no-purge mode) and shutdown (purge) (para 0023-0029). The motivation for combining this control on Epp et al.'s system would be to provide more hydrogen to the fuel cell during start up in order to bring it to full power. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to

implement the startup and shutdown functions of Meyer et al. in conjunction with the compressor of Epp et al. in order to provide a quicker startup for the fuel cell.

As to claim 14, Epp et al. teach the use of a secondary battery [306] for supplementing the power generated by the fuel cell (col. 11, lines 8-12). As Epp et al.'s system says that the power of the battery is only used when the fuel cell generated power is not enough, a sort of determination control is inherently applied to the load, fuel cell, and battery to determine if the battery power is needed. Because some sort of control is applied to it Epp et al.'s system is capable of controlling the supply of electric power from the secondary battery according to a state of the stop control of the fuel cells. (See rejection of claim 1 for the Office's position on "capable" of for an apparatus claim.)

As to claim 15, the battery in Epp et al.'s system inherently has an output demand input module that receives an output demand to the power system, wherein in response to the output demand of not greater than a preset level, the power control module controls the secondary battery to output electric power. The support for this is stated within Epp et al.'s use for the battery – the fact that it is only employed when the demand of electrical load [360] exceeds the output of the fuel cell stack [305] (col. 11, lines 8-12). As it talks about the demand of load [360] and output of fuel cell stack [305], it inherently has an output demand and input module. Furthermore, inherent control module has been previously established of being capable of executing the stop control in the hydrogen no-purge mode.

As to claim 16, Epp et al. does not teach that the secondary battery has a state of charge measurement module, wherein the stop control module executes the stop control of the hydrogen purge mode when the observed state of charge is not higher than that of a preset level.

However, there is motivation for providing the state-of-charge measurement module. The motivation for providing such a module on the secondary battery is to ensure that the load (in this case the submarine) has enough power to sustain the load. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to include the state-of-charge measurement module on the battery in order to provide the user of the load with a warning about battery replacement in order to ensure that the load will function. (There is motivation for applying a control system to the stop controller to purge when the state of charge is not higher than a certain value; it is in order to ensure proper shut down of the fuel cell system. Not only is this function obviated, but the system of Epp et al. would be capable of being programmed for such a function with the obviated state-of-charge measurement module on the secondary battery.)

As to claim 19, Epp et al.'s fuel cell system is used in submarines (as indicated by the title), which is a mobile object that has a motor as the driving source. Although it is specifically mentioned that the motor is drawing power from the fuel cell, the fuel cell is capable of providing power for the motor system. (See rejection of claim 1 for the Office's position on "capable" of for an apparatus claim.)

As to claim 20, the combination of Epp et al.'s mobile object (a submarine) and Meyer et al.'s startup/shutdown system provide a restart control module that restarts the fuel gas generation system (the end of the startup mode) (para 0028). This thus provides power to the mobile object, allowing it to move (as the use of fuel cell power in the motor has been previously obviated). As the startup mode follows a shutdown mode, it inherently restarts from a purge mode setting.

As to claim 23, the previously obviated fuel cell/submarine combination of Epp et al. and the startup/shutdown process of Meyer et al. is applied. Meyer et al. teaches that during startup the fuel cell that the anode is initially purged (para 0027). This is continued until the reformer [143] and the shift converter [136] (replaced with hydrogen separator) is approximately 250°C.

Meyer et al. does not, however, teach to purge the to purge the fuel processing system until the temperature at the reformer [134] shift converter [136] is 250°C. However, the motivation for purging the fuel processing system as well is to cleanse the system of any contaminants that could have gathered during the off time, so they would not be provided to the fuel cell once normal function of the fuel cell and fuel processor commenced. Furthermore, the flow of purge gases would aid in the warm-up process. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to purge the fuel processor when the shift converter is at a lower temperature than the preset level in order to purify and to warm the system up.

As to claims 25 and 29, Epp et al. teaches that the fuel cell system is used in submarines (as indicated by the title), but it does not specifically mention that power generated by their fuel cell system is used to power the motor of a mobile object. However, since the fuel cell system is applied to a submarine, the power generated is capable of being used for motor.

10. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Epp et al. in view of Meyer et al. (as applied to claims 1 and 19) in further view of US 2001/0016276 (Yamanashi).

As to claim 21, the mobile object (submarine) of Epp et al. inherently has a speed controller.

However, Epp et al. does not teach that the moving speed measurement module measures the speed and that the restart control module restarts the fuel gas generation systems when the observed moving speed exceeds a present level in the purge mode.

Yamanashi teach a system, where a fuel cell stack and reformer (although absent the hydrogen separator) is seen to be connected to a controller (fig. 1). Combining the fuel cell and vehicle control unit, which has vehicle speed sensor [25] would give the system the capability of performing the function as listed above. The motivation to combining the control system of Yamanashi with the combined system of Epp et al. and Meyer et al. is to more efficiently operate the fuel cell stack in tandem with the vehicle for easier and more efficient use. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to combine the control system of Yamanashi with the combined system of Epp et al. and

Meyer et al. in order to provide better usage of the fuel cell in combination with a motor vehicle.

As to claim 22, the previously obviated fuel cell/submarine combination of Epp et al. and the startup/shutdown process of Meyer et al. is applied. Meyer et al. teaches that during startup the fuel cell that the anode is initially purged (para 0027). This is continued until the reformer [143] and the shift converter [136] (replaced with hydrogen separator) is approximately 250°C.

Meyer et al. does not, however, teach to purge the fuel processing system until the temperature at the reformer [134] shift converter [136] is 250°C. However, the motivation for purging the fuel processing system as well is to cleanse the system of any contaminants that could have gathered during the off time, so they would not be provided to the fuel cell once normal function of the fuel cell and fuel processor commenced. Furthermore, the flow of purge gases would aid in the warm-up process. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to purge the fuel processor when the shift converter is at a lower temperature than the preset level in order to purify and to warm the system up.

11. Claims 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Aoyama et al. or Meyer et al. in view of Epp et al., Tillmetz et al., and Aoyama et al., as applied to claims 1 and 8, in further view of US 6391484 (Keskula et al.).

Although Aoyama et al. or alternately Meyer et al. in view of Epp et al., Tillmetz et al., and Aoyama et al., teach a heat exchanger [50] (heat retention module) that is adjacent to the hydrogen separator [60], wherein that the hydrogen separator membrane has a tendency of becoming fragile or brittle during low temperature absorbing (see Aoyama et al. para 0006, lines 1-4). (The time that the most hydrogen would be absorbed would be during the no-purge time rather than the purging time.) It is not taught that the heat retention module is either (1) an electric heater or (2) a combustor (as required by claims 31 and 32, respectively).

However, Keskula et al. teach heating modules, specifically that heat exchangers are known to obtain heat from combustors (as applied to claim 32), and that another known heating device for use in a fuel cell is an electric heater (col. 4). Therefore, it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use either a combustor or an electric heater as the heat retention module, as both are known to be heat retention devices (like a heat exchanger, embodied in Aoyama et al.), and thus using a combustor or electric heater as the heat retention device would have yielded the predictable result of acting as a heat retention.

Response to Arguments

12. Applicant's arguments filed July 24, 2008 have been fully considered but they are not persuasive.

With respect to the arguments regarding the 103 rejections, Applicant argues that the prior art used to obviate the rejected claims (Yamanashi et al. and Epp et al.) do not cure the deficiencies of the primary reference (Aoyama et al.). Applicant does not argue

how the combination is not proper. Therefore, the Examiner maintains the obviousness rejections and upholds the rejection of the primary reference, as above.

Applicant argues that Examiner's position that the control module inherently disclosed in Meyer et al. that is capable of having a stop control module is legally flawed in the same way as explained with respect to Aoyama et al.

Examiner respectfully disagrees and asserts that the response to arguments have clearly set forth the reasoning as to how the interpretation taken is not legally flawed (i.e. that such recitations within the claim are merely functional and thus fail to structurally define the apparatus). Examiner directs Applicant to section 3 for the full explanation.

Applicant argues that Examiner's reliance on inherency with respect to a control system and to a shut down procedure would be considered to include a hydrogen module that will result in purge and thus inherently anticipate the claim features.

Examiner respectfully disagrees with Applicant's position. Meyer et al., as applied, is relied upon and does clearly state what is controlled (even if such control system is not explicitly shown). The system, during shutdown controls switches and valves (para 0025-0026) and is thus indicative of a control system. (Control of the valves is depicted in fig. 1 and described in para 0021-0029.) The valves that are controlled in conjunction with the inherent controller are considered to be capable of functioning in a manner that can purge. Accordingly, the obviated invention using Meyer et al. (either Meyer et al. in view of Epp et al., as evidenced by Tillmetz et al. or Epp et al. in view of Meyer et al.) is structurally the same as the *claimed* invention and

thus reads on it. Again it is emphasized that the functional language used in the claim language does not limit the apparatus of the claimed invention.

Applicant argues that Examiner has not met the standard of inherency, specifically because Examiner states that Meyer is capable of stopping that it must inherently include some stop control module that is capable of switching the system between a purge mode and a no-purge mode.

Examiner respectfully disagrees and submits that the basis for inherency was provided. The portion that is relied upon on the basis for inherency is repeated herein: "Although a stop input module and stop control module is not specifically mentioned in Meyer et al.'s system, one inherently exist. This is exemplified by the fact that it talks about a shutdown system and the controlling of a switch [132], valves [141, 152, 154, 156], and blowers [116B, 116C]. In further accordance with Meyer et al.'s shutdown process, diverter valves [140, 149] are opened, which results in purging both sides of both sides of the fuel cell as well as the fuel processing system [104] of residual hydrogen and carbon monoxide (para 0025; para 0026, lines 1-4)." The fact that valves and switches are controlled are indicative that there is some sort of control controlling them (i.e. control unit). Examiner is unsure why Meyer et al.'s system fails to inherently have a control unit, when control processes are clearly being done. It is noted that due to the inherent control system, which controls the valves, as disclosed within para 0021-0029, would be capable of switching the system between a purge and no-purge mode, as set forth in the rejection. Since Applicant has not provided any reasoning as to how Examiner's position is not correct, the rejection of record is maintained.

Applicant clarifies that it is not being argued that Meyer et al.'s system inherently includes a control system. Applicant, rather, is arguing that having a start/stop control feature does not necessarily mean that it "...selects ... controls ... stops ... and executes ..."

Examiner respectfully disagrees with Applicant's position. It is first noted that inherency is being applied to the fact that a control system exists in Meyer et al. The inherent control system is stated to control the various valves, blowers, etc (fig. 1; para 0021-0029). Accordingly the inherent control system is viewed in conjunction with the valves that are controlled. The position is set forth that the inherent controller in combination with the valves, blowers, etc that it controls are capable of functioning in the same manner (wherein it "selects ... controls ... stops ... and executes" in the same manner). Accordingly, the obviated invention using Meyer et al. (either Meyer et al. in view of Epp et al., as evidenced by Tillmetz et al. or Epp et al. in view of Meyer et al.) is structurally the same as the *claimed* invention and thus reads on it. Applicant has not provided any showing or reasoning to the contrary, and therefore the rejection of record is maintained.

Applicant argues that the start/stop mechanism of Meyer et al. could be any mechanism, wherein there is error in asserting any control system that controls valves and switches teaches the recited feature.

Examiner respectfully disagrees with Applicant's position. Meyer et al.'s inherent control system (mechanism) which operates start/stop must be one that is connected in such a manner to control the valves, blowers, etc. in the manner disclosed within (see

para 0021-0029; fig. 1). This thus defines a relationship between the controller and valves. Accordingly, the valves that are controlled in conjunction with the inherent controller are viewed to be able to provide the same functions as that of the claimed invention and thus the system is structurally the same as the *claimed* invention and thus reads on the claimed invention.

Applicant argues many of the secondary pieces ((a) Epp and Tillmetz, (b) Aoyama et al. and Yamanashi et al. and (c) Keskula et al.) in various combinations with Meyer et al. are not applied in any meaningful way to claim 1 and that dependent claims of the alleged allowable claim 1 should be allowable for the same reasons as claim 1.

Examiner respectfully disagrees with Applicant's position. The rejections to the base claim has been upheld (see the rejection within this Office Action and the responses to the arguments within). Accordingly, since Applicant does not argue how the rejections of the dependent claims or the obviousness made with respect to them are improper, Examiner maintains those rejections and upholds the rejection to the independent claim, as above.

Applicant argues that newly added claim 33 has a feature wherein the stop control module selects the hydrogen purge mode as the stop control mode when the stop control mode executes stop control to the fuel gas generation system for a long period of time, and the stop control module selects the hydrogen no-purge mode as the stop control mode when the stop control module executes stop control to temporarily stop the fuel gas is allowable, because the base claim should be allowable.

Examiner respectfully disagrees. The rejection to the base claim has been upheld (see the rejection within this Office Action and the responses to the arguments within). Accordingly, claim 33 is rejected for the reasons set forth within the rejection. (It is noted that the claim language in claim 33 is functional language, as well.)

Therefore, the arguments presented herein (as similarly presented within the interview) are not found to be persuasive, as set forth above. Thus, the rejection of record is maintained.

Allowable Subject Matter

13. Claim 30 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims. The reasons as to why none of the prior art of record, alone or in combination, appear to teach, suggest, or render obvious the invention of claim 30 has been set forth in the Office Action dated March 25, 2008, which is herein incorporated.

Conclusion

14. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to EUGENIA WANG whose telephone number is (571)272-4942. The examiner can normally be reached on 7 - 4:30 Mon. - Thurs., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/E. W./
Examiner, Art Unit 1795

/PATRICK RYAN/

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Supervisory Patent Examiner, Art Unit 1795